

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1, 3-16, and 18-21 are pending in the present application. Claims 1, 3-5, 8-10, 12, 15, 16, 18, and 20 are amended, and claim 21 is newly added by this amendment. Claims 2 and 17 are canceled without prejudice or disclaimer.

ABSTRACT

The Abstract was objected to for exceeding 150 words in length. In response to this objection, the Abstract is amended to not exceed 150 words in length.

Accordingly, Applicant respectfully requests that the objection to the Abstract be withdrawn.

CLAIM OBJECTIONS

Claims 1, 3-5, 8-10, 12, 15-18, and 20 were objected to as including minor informalities. In response to this objection, claims 1, 3-5, 8-10, 12, 15, 16, 18, and 20 are amended as suggested in paragraph 2 of the March 23, 2005 Office Action.

Therefore, Applicant respectfully requests that the objections to claims 1, 3-5, 8-10, 12, 15-18, and 20 be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. § 112

Claim 15 stands rejected under 35 U.S.C. § 112, second paragraph as indefinite. Applicant respectfully traverses this rejection for the reasons detailed below.

Claim 15 is amended to delete the word “optionally” indicated by the Examiner as causing claim 15 to be indefinite.

Therefore, Applicant respectfully requests that the rejection of Claim 15 under 35 U.S.C. § 112, second paragraph be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. § 103

Claims 1-17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Komardin et al. (U.S. Patent No. 6,175,117, herein Komardin) in view of Francke (U.S. Patent No. 6,476,397).

Applicant respectfully traverses this rejection for the reasons detailed below.

Amended independent claims 1 and 10 recite an apparatus for obtaining coherent scatter imaging data of an examination object. Amended claims 1 and 10 recite, *inter alia*, the following:

- a radiation detector arrangement comprising a stack of line detector units, **each being directed towards a small portion of a trajectory of said radiation beam** in said examination object to allow a respective substantially fan-shaped ray bundle of said radiation beam as coherently scattered in said examination object to enter a respective line detector unit and be detected therein; wherein

- each of said line detector units **has an elongated opening** for entry of the respective fan-shaped coherently scattered ray bundle; a row of individual detector elements arranged essentially parallel with said elongated opening; and is of the kind wherein charges or photons, generated by interactions between the respective fan-shaped coherently scattered ray bundle and a detection medium within the line detector unit and traveling in a direction essentially perpendicular to the respective fan-shaped coherently scattered ray bundle, are detected by said row of individual detector elements; and

- said line detector units and their respective individual detector elements **are formed and oriented so as to allow simultaneous recording of coherent scatter imaging data sufficient to form a plurality of one-dimensional images**, each being composed from radiation as coherently scattered in said examination object in a respective angle. (emphasis added)

As recited above, the claimed invention provides an inventive arrangement of line detector units.

An example embodiment of the present invention, as recited in claim 1 and explained with respect to the non-limiting example of figure 1, may provide a plurality of one-dimensional images, wherein each image is composed of a specific signal value from each line detector, i.e. $N/2-1$ picture elements are obtained for each image, N being the number of line detectors. Image 1 includes $N/2-1$ signal values from each respective line detector's read-out unit having angle β_1 , image 2 includes $N/2-1$ signal values from each respective line detector's read-out unit having angle β_2 , etc. Therefore, according to an example embodiment of the invention, M pictures in total are obtained, taken simultaneously at angles β_1 to β_M .

Another example embodiment of the present invention, as recited in claim 10 and explained with respect to the non-limiting example of figure 3a, may provide a plurality of one-dimensional images. However, each one-dimensional image in this example embodiment is composed of signal values from a single line detector unit. M picture elements are obtained, wherein M is the number of read-out units in each line detector. Image 1 includes M signal values from line detector $6a_1$, image 2 includes M signal values from line detector $6a_2$, etc. Accordingly, $N-1$ images are obtained in total, taken simultaneously at angles α_1 to α_N .

Therefore, the structure of both amended claims 1 and 10 enable simultaneous images to be taken. Accordingly, one-dimensional images are obtained by radiation scattered in a specific, separate angles, and instantaneous imaging is achieved without scanning, which is both novel and inventive. Further, if scanning is performed as recited in claims 8 and 9, several two-dimensional images are obtained.

Applicant respectfully notes that amended claim 16 and new claim 21 recite methods including features similar to claims 1 and 10.

Komardin describes a tissue analysis apparatus aimed at providing an apparatus that makes a mammography less uncomfortable for the patient being examined. More specifically, Komardin is directed to avoiding compressing the breast of the patient during imaging and avoiding inserting a needle into the breast should a biopsy be needed.¹ Komardin is thus aimed at providing a comfortable way to obtain images of a breast and an improved way of analyzing tissue. In light of the above objectives, the beam forming apparatus described in Komardin is designed to have a certain geometry. Accordingly, Komardin provides an incident beam forming design, in which each incident beam has a length sufficient to cover the entire width of a breast.² The beam forming apparatus, therefore, forms the radiation into a diverging incident beam, sufficiently long to be incident on one entire dimension of a breast, thereby avoiding the need to compress the breast during imaging.

The detection arrangement of Komardin describes an array of detector elements aligned in rows and columns, wherein a scattered photon will strike a particular detector element. This is an example of a conventional way to detect scattered radiation. Further evidence that the detector elements of Komardin are not directed or arranged in the specific manner as described in amended claims 1 and 10 is provided at column 12, lines 12-17 of Komardin, stating “the detector elements 180 are illustrated as aligned in rows 182 and columns 184 on the detector 28 but in some embodiments the detector elements 180 can be aligned in a circular array or can be shaped as concentric circles.”

Conversely, as described above, amended claims 1 and 10 provide an inventive radiation detector arrangement including “a stack of line detector units, *each being directed towards a small portion of a trajectory* of said radiation beam in said examination object,” “each of said

¹ Komardin, column 1, lines 45-63.

² Komardin, column 5, line 40 et seq.

line detector units has an elongated opening for entry of the respective fan-shaped coherently scattered ray bundle,” and “said line detector units and their respective individual detector elements are formed and oriented so as to allow simultaneous recording of coherent scatter imaging data sufficient to form a plurality of one-dimensional images.”

The Examiner cites figure 6a, #32 as disclosing each stack of line detector units being directed towards a small portion of a trajectory. However, the positions (left, right #32) are along different trajectories and along different beams. The Examiner cites column 4, lines 40-44 of Komardin as allowing a simultaneous recording of coherent scatter imaging data. However, column 4, lines 40-44, only describe how to determine the kind of substance that is scattering an incident beam using different substances having different scattering patterns. Further, Komardin involves a scanning, and a plurality of images are not obtained simultaneously.

Accordingly, Applicant respectfully submits that Komardin fails to disclose, teach, or suggest at least the above-emphasized features of amended claims 1 and 10.

Francke is directed to utilizing a gaseous-based parallel plate detector for detecting ionizing radiation. In Francke, a number of detectors may be stacked side-by-side of each other, thereby achieving a multi-line scan reducing the scanning time as well as the overall scanning distance. An x-ray source together with a number of collimator windows produces a number of planar fan-shaped x-ray beams for irradiation of the object (e.g. breast) to be examined.

However, Francke fails to cure the deficiencies of Komardin discussed above with respect to amended claims 1 and 10.

Further, Applicant respectfully submits that the Action does not present the required “convincing line of reasoning as to why the artisan would have found the claimed invention to

have been obvious in light of the teachings of the references,” Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

Therefore, in light of the above discussion, Applicant respectfully requests that the rejection of claims 1-17 under 35 U.S.C. § 103(a) be withdrawn.

Claims 18-20 stand rejection under 35 U.S.C. §103(a) as unpatentable over Grodzins et al. (U.S. Patent No. 6,442,233, herein Grodzins) in view of Francke. Applicant respectfully traverses this rejection for the reasons detailed below.

Claim 18 recites features similar to amended claims 1 and 10 described above. Further, claims 18 recites, *inter alia*, “the detector elements of said line detector unit **are separated, elongated, and directed so their extension lines converge on a single point in said small portion**, and therefore detect different angular portions of the fan-shaped ray bundle entered into the line detector.” Claims 19 and 20 depend from claim 18 and therefore include the above-identified feature of claim 18.

Grodzins discloses a system for inspecting enclosures. Figure 2a of Grodzins clearly illustrates that the detectors (50, 52) are not directed towards a same small portion of the radiation beam.

Therefore, Grodzins fails to disclose, teach, or suggest the above-identified feature of claim 18. Francke fails to cure the deficiencies of Grodzins at least with respect to the above-emphasized feature of claim 18.

Further, Applicant respectfully submits that the Action fails to provide a convincing line of reasoning for combining Grodzins with Francke.

In light of the above, Applicant respectfully requests that the rejection of claims 18-20 under 35 U.S.C. §103(a) be withdrawn.

NEW CLAIM

Claim 21 has been added in an effort to provide further protection for Applicant's invention. New claim 21 claims a method corresponding to the apparatus of claim 10, and is believed to patentably distinguish over the cited reference of record.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested.

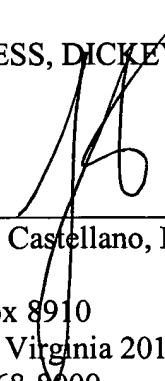
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John A. Castellano at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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By



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